

REMARKS

Favorable reconsideration and allowance of the subject application are respectfully requested. Claims 1-25 are pending in the present application, with claims 1, 13, 15, and 16 being independent. Claims 19-25 have been added by this amendment, which do not add any new subject matter.

Allowable Subject Matter

Applicant notes with appreciation the Examiner's indication on pages 5-6 of the Office Action that claim 15 is allowed, and that claim 13 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. For at least the reasons detailed below, Applicant respectfully submits that all pending claims are allowable.

Objection to the Specification and Claims

The Examiner objected to the specification and claims because of line spacing. Applicant submits herewith a substitute specification, wherein the spacing between the lines is double-spaced. Furthermore, Applicant has amended the specification, correcting minor informalities. The claims have been amended in an effort to correct minor informalities, and to place them into

proper form for U.S. patent practice. No new matter has been introduced. Accordingly, Applicant respectfully requests the Examiner to withdraw the objections.

Claim Rejections under 35 U.S.C. §§101 and 112

The Examiner rejected claim 12 under 35 U.S.C. §§101 and 112, and rejected claims 14 and 18 under 35 U.S.C. §112. These rejections are respectfully traversed.

Claim 12 has been amended to properly depend from claim 1, and now positively recites that the adjusted shape reduces the cogging torque of the actuator. Therefore, claim 12 is definite.

Regarding claims 14 and 18, Applicant has amended the claims in an effort to clarify the informalities cited by the Examiner.

Accordingly, Applicant respectfully requests that the Examiner withdraw each of the rejections.

Claim Rejections under 35 U.S.C. §103

The Examiner rejected claims 1-4, 6-12, 14 and 16-18 under 35 U.S.C. 103(a) as being unpatentable over *Spiesberger et al.* (US 4,031,419) in view of *Suzuki et al.* (US 5,030,868). These rejections are respectfully traversed insofar as they pertain to the presently pending claims.

Applicant would first like to note that although claim 5 was

not rejected under any section of 35 U.S.C, for response purposes, it was assumed that the Examiner intended to include claim 5 in the rejection under 35 U.S.C. §103(a).

Independent claim 1 is directed to an electromagnetic rotary actuator, controlled by a single voltage, and includes: a rotor movable about an axis and having permanent magnets; and a stator carrying at least one winding and an airgap between facing surfaces of the permanent magnets and of the stator, the permanent magnets being arranged to have flux lines extending in the airgap substantially in a radial direction from or towards the axis. The stator also has at least three pole teeth made of a magnetically permeable material, in particular a soft-iron material, such that at least one winding is applied around a central one of the pole teeth. The pole teeth have end surfaces forming the facing surfaces of the stator and thus facing surfaces of the permanent magnets over the airgap.

Spiesberger et al. is directed to a self-starting or stepping motor having a permanent magnet rotor 20 and a stator 21, which includes inwardly facing main stator poles 2-4 and 5-7 and additional auxiliary poles 1, 8 that have no windings.

Suzuki et al. is directed to a brushless DC motor that includes a stator 2 and a rotor 11. The stator 2 includes magnetic poles 3a-3d, which include coils 4a-4d, and interpoles 5ab-5da.

Applicant respectfully submits that the cited prior art, taken alone or in combination (assuming these references may be combined, which Applicant does not admit), fails to teach or suggest at least an electromagnetic rotary actuator that is controlled by a single voltage, as recited in independent claim 1.

Applicant respectfully submits that the *Spiesberger* design is controlled by **at least two voltages**. This is apparent from the text "Two phase motor" above Figures 1, 2, 3 and 5 and the text "Three phase motor" above Figure 4. Fig 1b shows the windings as two independent equivalent coils w2 and w1; it is seen in Fig 1a that equivalent coil w1 consists of the coils around stator teeth 2, 3 and 4 and that equivalent coil w2 consists of the coils around stator teeth 5, 6 and 7. Fig 1b shows the two equivalent coils w1 and w2 connected to two different voltages, w2 directly to the voltage between line Mp and the left side of the switch, and w1 connected to the voltage that is appearing between the line Mp and the capacitor C. Fig 8a shows the relative relationship between the phases Fi1 and Fi2; as is normal for two phase motors being driven by a single sinusoidal voltage, the capacitor C is selected to give approximately 90 degrees phase shift between the two phases, and these 90 degrees are also shown in figure 8a.

On page 5 of the Office Action, the Examiner alleges that the two outermost stator pole airgap surfaces of *Suzuki et al.* have an adjusted shape to reduce the cogging torque of the actuator.

Applicant respectfully submits that the purpose of the different shapes of the magnet cut-outs of the cited U.S. patent 5,030,868 for *Suzuki et al.* is not stated in that patent. The text covering Figs. 5a-e does not mention any purpose to reduce cogging torque. There seems to be no statement in the patent that contradicts the hypothesis that *Suzuki* specifically described the alternative shapes shown in Fig. 5 mainly to avoid that someone would try to work around his patent by making a shape of the grooves that differs from the simple rectangular cut-out shown by *Suzuki* in Figures 1 and 2: "The groove cut-out in the magnet is not limited to a rectangular shape as viewed in crosssection. There may be other different shapes, such as A-E on Fig. 5... Other different shapes of the groove may be possible." (Column 5, lines 45-58.)

The point for *Suzuki* is to replace variations of magnetizing fields on a even thickness magnet, which he claims to be difficult (see top of column 2) with the more reliable principle of having magnets with mechanical grooves that are entirely magnetized. It is easy to make repeatable mechanical grooves, and it is easy to provide a strong field that saturates the magnet material (see

column 2, lines 24-40). It is more difficult to provide a field that partly magnetizes a magnet material in a repeatable way.

Accordingly, because *Spiesberger et al.* and *Suzuki et al.*, either alone or in combination, fail to teach or suggest all of the combination of elements as recited in independent claim 1, Applicant respectfully requests that the Examiner withdraw the rejection against claim 1 and dependent claims 2-12 and 14.

Regarding independent claim 16, Applicant respectfully submits that none of the cited prior art teaches or suggests at least that an electronic circuit is connected to a winding or windings of the actuator, wherein a resistance changer increases a resistance in series with the actuator winding when a longer electric time constant is advantageous or required and reduces the resistance in series with the actuator winding when a shorter electric time constant is advantageous or required, as recited in claim 16.

Furthermore, the Examiner did not specifically reject claim 16. MPEP 706.02(j) recites in pertinent part that "the examiner should set forth in the Office action...the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate." Additionally, "[w]here a reference is relied on to support a rejection, whether or not in a minor capacity, that reference should be positively included in the statement of the

rejection," see *In re Hoch*, 428 F.2d 1341, 1342 n.3 166 USPQ 406, 407 n.3 (CCPA 1970).

Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection to claim 16. Claims 17-18 are dependent claims, which should be considered allowable at least for depending from an allowable base claim, and therefore, Applicant also requests that the Examiner withdraw the rejection to claims 17-18.

Added claims 19-25 should be considered allowable at least for depending from an allowable base claim. Claim 13 has been amended to include the subject matter of its base claim. Therefore, claim 13 should now be allowed.

Regarding claim 24, and referring to any of the figures of *Spiesberger et al*, it is readily discernable that the stator 21 completely encircles the rotor 20, and therefore could not possibly contain an opening in a circumferential plane. Furthermore, referring to the figures of *Suzuki et al*. it is also readily seen that not only does the rotor encircle the stator, the stator also does not contain an opening in a circumferential plane. As such, claim 24 should thus be considered allowable.

Conclusion

In view of the above amendments and remarks, this application appears to be in condition for allowance and the Examiner is,

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therefore, requested to reexamine the application and pass the claims to issue.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant respectfully petitions for a three (3) month extension of time for filing a reply in connection with the present application, and the required fee of \$465.00 is attached hereto.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at (703) 205-8000, which is located in the Washington, DC area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By  #51,011
For Michael K. Mutter, Reg.#29,680

MKM/MRG:tm
1291-0189P

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

Attachment: Substitute Specification
Marked-up Original Specification